DOCUMENT RESUME

ED 243 150 CS 208 300

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TITLE The Trying Out of the Essay: How Scientific Essayists Compose.
PUB DATE Mar 84
NOTE 18p.; Paper presented at the Annual Meeting of the Conference on College Composition and Communication (35th, New York City, NY, March 29-31, 1984).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Authors; Cognitive Processes; *Comparative Analysis; Concept Formation; Creative Thinking; *Essays; *Interviews; Writing for Publication; *Writing Processes; *Writing Research
IDENTIFIERS *Scientific Essays

ABSTRACT

Six scientific essayists were interviewed to gain some understanding of their writing processes. The writers were Roger Sawin, who writes for "Horticulture"; Harold Morowitz who writes for "Hospital Practices," "Science 82" and "Science 83"; Stephen Jay Gould who writes for "Natural History"; Jeremy Bernstein who writes for the "New Yorker" and "American Scholar"; Lewis Thomas who wrote for "The New England Journal of Medicine" and currently writes for "Discover"; and Freeman Dyson who has written for a variety of general interest magazines. In addition, each has written other works. The interviews revealed that, similar to college composition class students, most of them produced essays of 800-2,500 words and took two weeks to compose the essay. Although each of the essayists wrote differently, they all said the majority of the time was spent on deciding on the topic, researching the topic, and then loosely thinking about the subject. Writers pull ideas together by having a clear, concrete theme to which they can connect other ideas. Each of the writers also writes to a community of readers which, in turn, influences their writing throughout the process. Fundamentally, the interviews revealed that the essayists thought, researched, discussed, wrote and revised--and thought the experience to be fun. (HOD)

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THE TRYING OUT OF THE ESSAY: HOW SCIENTIFIC ESSAYISTS COMPOSE

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THE TRYING OUT OF THE ESSAY: HOW SCIENTIFIC ESSAYISTS COMPOSE

Presented at the Conference on College Composition and Communication March 29-31, 1984, New York, New York

As composition teachers, we are interested in the writing process, and many of us read about the writing process of professional novelists and poets to gain some understanding of what is involved in writing. However, since we ask our students to produce nonfiction, I thought that asking people who write essays might provide more useful information about the professional writing process for composition teachers.

So in October of 1982, I did a series of interviews with six essayists. The writers were Roger Swain, author of a column in Horticulture and of the books Earthly Pleasures and Field Days; Harold Morowitz who writes a column for Hospital Practices, Science 82 and 83 and has published a collection entitled The Wine of Life, Stephen Jay Gould who writes "This View of Life" for Natural History and has published three collections of these columns: Ever Since Darwin, The Panda's Thumb, and Hen's Teeth and Horse's Toes; Jeremy Bernstein who writes for the New Yorker, does a column in American Scholar and also has three collections: A Comprehensible World, Experiencing Science, and Science Observed; Lewis Thomas who did a column for The New England Journal of Medicine, currently does one for Discover, has published three collections of those columns and an autobiography which he admits is a collection of essays; and Freeman Dyson who has written for a variety of general interest magazines and whose autobiography Disturbing the Universe is also a collection of essays. Although I realize that list was rather long, I wanted

you to know who these people are that I am going to discuss. As you might have noticed the primary audience for these columns or essays is quite diverse--from those with a large amount of scientific background to those with none--even those who may not have any interest in science. One does not usually pick up the New Yorker to read about science.

The major reason why I thing this group of essayists is important for composition teachers to examine is because their writing conditions closely resemble the writing conditions of composition class students. Most of them are columnists who must produce a specific length essay--eight hundred to twenty-five hundred words or about what we expect from students--by a specific deadline. All of the essayists have other jobs; four of them are academics; one is an editor, and Thomas has recently retired from being the director of Memorial Sloan Kettering Cancer Institute. So none of them make their living by writing. It is something they work in just as students are working their writing in among other courses. Another similarity which I didn't learn until I did the interviews was that most of them spend two weeks on writing an essay. As Gould said, "About two weeks before it's due, it hits me that I've got to get a column out." Since we ususally give our students two weeks to write a paper it is somewhat reassuring to have a professional tell you that's how long it takes, but it is also disconcerting because our students don't have the resources or the practice that these writers do. Another similarity is that most of the columnists were solicited. They were asked to write it, and in some sense it is an obligation

just as students are "obliged" or required to take a composition course. Morowitz said, "I've thought of it as I'm taking a course called monthly theme."

I suppose that much of what I learned isn't surprising given all the research on the composing process. People write differently--from Morowitz who may do six or seven drafts to Gould who does one draft and says, "Who's got time for more?" Everyone, however, said the majority of the time was spent on thinking to decide the topic, researching the topic, and then as Swain said, "loosely thinking about the subject, sort of letting it begin to fill up my mind." Thomas said he did his thinking driving between Manhattan and Long Island, which adds to the greatness of his essays in my opinion.

And where do these topics come from? In some cases, they were ideas the person had been mulling over for years. Morowitz said that about one essay in particular, "The Six Million Dollar Man," and Gould said his first essays for Natural History were all along the lines of things he had wanted to write about for years. Most of them come out of a personal interest or incident. Usually the essayists connect that experience to a major theme which is developed throughout their work which leads me to another point of interest as composition teachers. All of the writers said they perceived the form as a way of pulling disparate ideas together. Both Thomas and Gould admitted they were interested in many different things and used the essay as a way of reconciling these interests. One of the ways these writers pull ideas together

is by having a clear theme, something which they know a graat deal about and then they connect other ideas to it. Gould is a good example of this. By his own admission, he writes about evolutionary theory, what it is, how it works. But his starting points are quite diverse: a tour of La Grand Galerie of the Museum d'Histoire Naturelle in Paris, Mickey Mouse, Victorian literary genres, the Mikado, the fact that in most species the male is smaller than the female, a bet that no woman would win the Boston marathon in his life. Morowitz is not quite as insistent on one theme, but as a biophysicist who studies the thermodynamic properties of living organisms, it isn't unusual that many of his essays deal with energy. And he has found the Second Law of Thermodynamics to be revealed in the Sermon on the Mount and had a realization that housework is just an effort to attack entropy so no wonder women are demanding that men do an equal part in that impossible job. Thomas seems to be interested in communities and finds that language and science are our communal impulses, so he begins with ants, or Woods Hole Marine Biological Laboratory or birdsong or Mahler and relates it to our need for community. As you might have noticed, the examples of starting places are of concrete, specific events and objects. I often have trouble getting my students to be concrete and making them draw connections between the abstract and the concrete might help. Focusing on a theme might help them also as it would provide the abstract point for their work, and they would spend the semester exploring all the different concrete examples and manifestations of that theme.

And now I just want to relate how three writers describe their writing processes. I hope this will illustrate some of the differences and some of the similarities. Please remember that most of the people weren't comfortable acting like there was something deliberate about their writing. It certainly wasn't a process they analyzed or admitted they analyzed. While I was talking to Steve Gould, a collegue of his happened to walk up and asked what was going on. Gould replied, "She wants know how I write and the answer is I don't know." This attitude basically characterizes all of the writers.

Since Gould was anomalous in his process, I shall begin with him.

> I'm a Platonist when it comes to essays. I think that once you decide on a topic that there really is a correct way of writing it. There is an outline somewhere in heaven, and you have to find it, and you find it. Basically, what I do is, I don't consciously sit down and try to find it, cause I'm not a deductive thinker. I just read; I start reading. I read and I read and eventually I realize the right way to do it. It just comes to me and then I know it's the right way. No, I never write an essay until it's very, very extensivley outlined. It may not be pages and pages; it may just be five or six key topics. And then that really is very helpful to me because I don't write drafts. After that I just write it. I do a lot of internal revisions as I write, of course. I'm not Mozart just writing down the music. I doubt if anybody

could write that way. But I don't write and re-write and shift paragraphs. Once I have the outline, that's it, and I just write the essay.

Everybody has some lucky skill. One of my lucky skills is that I have a very good short term memory. I can remember almost anything I read for two weeks, even what page it's on. Then I forget it entirely. It's a skill that's of very limited use for long-term scholarship. What I do for an essay is I know I can remember anything for a week and a half or two, so I just start. I decide on the topic. I don't necessarily know it's outline; I usually don't know it's outline. I just know what topic and what ideas. Then I start reading, and I pick a few basic sources. Most of my essays are usually from one source from which I get collateral knowledge. I read until the outline comes, which it will in a couple of days or a couple of hours. And then when that comes, I just sit down and write it. I have a little monitor in my brain which stops somewhere between twenty-five hundred and thirty-five hundred words. As I've said, I don't write drafts; I do a lot of internal revision as I write. But once a paragraph is complete, it's not changed or switched around. I asked what he revised for in his internal revisions, and he replied, "Language, style. Not content."

This writing process is born of a great deal of confidence in one's writing ability. Gould never used the word inspiration, but that was the feeling I got from him that once he decided a topic was

interesting, he was inspired to write about it. Bernstein also discussed his work in similar terms. "I simply have an idea which is writable, which I can write." But the other writers tended to be somewhat different. Morowitz and Swain both emphasized the re-writing process and have interesting similarities which may be of particular interest to those interested in structuring a composition class.

I asked Roger Swain to tell me how he wrote from start to finish. He replied:

> First of all I hate writing. I regularly resolve to give it all up. So I avoid writing as long as possible, and if it weren't for deadlines, I'd never get anything done. But I know when the article is due. In the case of these columns for Horticulture, I know an article is due but I haven't the faintest idea what it's about. In the preceding four or five weeks before it's due I start trying to figure out what I'm going to do it on. That probably takes a week as I try out various ideas, and sometimes I've been lucky and I've read something or heard something, and I've made a mental note to myself that that would make a nice column sometime. But sometimes I'm as starved for information as to sit down in my office and look at my personal library and pull books off the shelves and thumb through them looking for something that strikes me as novel. You choose a subject and as soon as you have a subject you announce it to everybody. You say, "I am writing an article on whatever." Most people just look

at you and go, "Oh, nice, fine," but some people say, "Oh hey, I heard a story about it, or, did I ever tell you, or that reminds me of." It's amazing how many little tidbits you can pick up just in restaurants, dining rooms, and on the street, little bits that you seldom use in their entirety, but you may slip in or make use of. In general, I spend the next three weeks loosely thinking about the subject, sort of letting it begin to fill up my mind. I always resolve that I ought to be writing the International Corn Institute, or that I ought to be doing something but I never get it done. Then about three weeks before the deadline, I get a little worried that I'm not going to get this thing done, and I start doing research. I comb libraries and indexes, just gathering material. I'll read secondary material if I can't find anything else, but I'm very distrustful of it and reluctant to do any more than just look at it. Generally, I play around in primary references which are hard to find because the people who wrote the primary material weren't thinking about the subject at all as you were. And what I'm good at is bridging this gulf between the academic literature and the public. I am a glutton for information, and I accumulate vast amounts. I accumulate ten times as much information as I could possibly ever use, and then I think about it awhile. Lots of thinking, lots of mulling it over and probably two weeks before the piece is due, I start writing. Actually I spend the first week trying to start writing. I write the first sentence, and it takes

me a full two days to get the first sentence. Of course, in the process of choosing the first sentence, you are making the decision of where you are going to begin and what this article is going to be about which is the hardest part of any article. I'm kind of proud of my first sentences. None of them were written casually; everyone was written with extreme care. The second most important sentence to the first is the last, and I have of late taken to writing the first and last early on, and then working up the middle of the text. Sometimes, however, the last doesn't come until you're well into it. So I'm writing; I've got the first sentence. Then I write the first paragraph; then supposing I take a break; then I get back to work. I tend to write in the mornings. I never pick up a piece and start working on it in the middle. I always go back to the beginning and perhaps that will always limit my length because I can't limit myself. It's like Sandburg writing the whole piece out until it's right, and I really have to start at the beginning because it's as I write point, point that I get a rhythm up. It's as though we were playing a little bit of music. It doesn't sound right just to start with a note. You can't just start with a note; you've got to back up, get up speed, get the orchestration going and then plow through the next drift. It's sort of like plowing snow; it helps if you back up to the clear space. Sometimes I'll write out a whole page making no changes at all, and then when I'm up

to speed, blast through the next paragraph or two. I read all of it aloud a lot, over and over, listening to the way the words sound, listening to the way the points are made. I think my ear is better than my eye for detecting pacing problems. I will read bits and pieces aloud to my wife. By the time I get to the end of an article, my wife has heard it all several times. So, it takes two days to do the first sentence. Another day will get me about a third of the way through the piece, and maybe if I'm very lucky, the next day will finish it up. As I get near the end, I stop sleeping; as I get near the end, I get **downright** possessed. There is no joy in my house. My children steer wide of me; my wife feeds me, but largely doesn't try to communicate with me just because I know I'm nearly done. I know I have to wind this thing up somehow, but I'm not quite sure how to do it and that uncertainty is all consuming. When the last sentence has been written, even before it's been typed--I write all my stuff longhand, number two pencil and give it to a typist to type--when it's done, there is no doubt in my mind that it's good, that it's tight. It takes a week or more of total concentration to write a piece that's two thousand words to ten thousand words. It's a bit of an ordeal at points. Other people read it; other people comment on it. It has been subjected to a certain amount of criticism. Several people have gotten their bits in. I get it typed, and then I take a copy of that over to a friend of mine **who's** an editor,

and he goes over it, and he occasionally makes a substantive change. He occasionally suggests that I get rid of a whole paragraph or rewrite something, and I make that change, but I would say that his changes are made only twenty per cent of the time. By the time the editors get their hands on it, it's set.

Morowitz had a similar composing process, one which involved readers or hearers.

I always start writing on yellow, lined paper, eight and a half by eleven. I'm so geared to that that I wonder if I would stop writing if the supply disappeared! Beyond that there is an enormous difference. I have sat down, rarely but it has happened, and the essay has emerged almost in finished form. Some essays have gone in and out of my folder for five years before they emerge. Some never emerge. But in any case, I sit down with the thoughts, and I write a first draft. Generally the first draft will be done in a day or two. Then I generally go through the first draft again and make notes on it so that by the time it goes for the first typing it's pretty messy. Very often my wife, Lucille, does the typing on the first draft because no one else can read it. It goes through the first typing. At that stage, again, there are lots of possibilities. I mean, one is that I will start revising. On almost all my essays Lucille enters into it at one stage and will give me comments and depending on what the essay is, I'll give

it to other people to read. Either at that stage or the next one. 'The other people most often are my children. Well nowdays it may be whichever of my children is handiest. Now they're spread out from the immediate area, or whoever has a speciality in that area, I'll have them review it. My son is doing medicine so for a Hospital Practice article, I will sometimes ask him how this will hit a physician's audience. Or my daughter knows no science formally; she's a lawyer. She has no experience in science. She is very good for comments. She and my youngest son, who is in drama, are good for bouncing ideas off them to see if I have really gone too far with the jargon. They have an interest in science. If I've gone too far with the jargon, so far that no one can understand it, they say so. Generally, the essays go through two or three typings, and as I say, the process can be anywhere from the first draft being rather final to the thing being spread out. I guess six or seven re-dos is about the maximum I've ever done. Two to four is more common. The ideas that tend to get thrown out after my family has read them, I think are things that I've gotten excited about that they considered pedestrian. If we can step back, one thing I haven't told you is that somewhere, either during the first draft or between the first and second, I'm usually at a library. Now it may be my own book collection here at the lab, but somewhere along the way I'm there because of background reading that I need because I don't know enough about the subject, some specific

information, or I'm tracking down something I remember having read. So there is a very extensive interaction with books. Then I revise for my style, for clarity. I try to be aware of craft as a writer. One thing which gets me going is I tend to get on a word, to get on a title. I sometimes make puns, but often the puns are atrocious. Titles are very important. Very often, more often than not it goes idea, title, essay. Sometimes it goes idea, essay, title. The best titles are the ones that go the other way. Somehow if one can get a title that encapsulates the thought or lightens it, you know, one has to avoid being pompous, too academic and so forth, and a title very often does that.

From these two examples and from Lewis Thomas who called his wife a "great unconscious editor," and his family that tells him to publish things, it is apparent that a community of readers is very necessary. This is, of course, an idea which James Moffett suggests in The Universe of Discourse and Peter Elbow in Writing Without Teachers. Perhaps we need to encourage students to set up their own community of readers who will be with them through other courses and not just set up our course as that community. Readers, as these interviews show, do influence writing. And not just in comprehensibility or style. Morowitz's readers tell him whether it's interesting. Lewis Thomas's daughter told him to publish "Late Night Thoughts on Listening to Mahler's Ninth Symphony," which had just come out in Discover when I interviewed him. Thomas said that he had originally written the essay to deal with his own emotional reaction to Jonathan Schell's

The Fate of the Earth, which isn't mentioned in the essay. It is a powerful, persuasive piece on nuclear war which seems clearly intended to affect an audience's response to the arms race and civil defense. He showed it to his daughter, who has a dgree in musicology, mainly to share his reaction to the Mahler, and she convinced him that it should be published. Perhaps all types of writing are a family affair, but it certainly seems that the literary scientific essay thrives under these conditions. Lest you think there is no hope for the single, Jeremy Bernstein said he would write for his friends, something they might be interested in. We as teachers might do well to recognize this community of readers as an integral part of the writing process.

Given this seeking out of audiences, I was rather surprised by the intial insistence of all six writers that they weren't really interested in influencing an audience or even too sure of who their audience actually was. But as our conversations continued, I felt that most of them did have an audience in mind which was, in fact, fairly close to the actual audience of the works. Freeman Dyson said that he wrote his autobiography, Disturbing the Universe, for his sister, "a proper English lady in her sixties who had never been exposed to science." Gould, in my interview, although I understand not always, seems to be trying to influence the scientific community. Morowitz talked about audiences sometimes not at all similar to his actual audience of hospital administrators such as an essay he wrote directed at members of Congress and another directed at the Yale administration. These ideas of audience led me to wonder if we don't as teachers sometimes

need to go in the back door with the idea of the specific audience. Rather than detailing an audience, providing a community of readers may give a writer all the audience awareness that he or she needs. Perhaps within that framework, we could encourage them to branch out in directions similar to those of Morowitz. Or we need to try and make them aware that they need to think about who is going to be interested in this. I have begun to make my classes do more justification of why someone should want to read their papers as a means of getting them to address the issue of audience. These professional writers, obviously, spend little of the actual essay engaged in justification, but usually that is a question they address when deciding on a topic. Thomas said he would write when it occured to him the topic was one "everyone ought to be interested in." Notice the implications of that ought. Morowitz's family made him jettison topics as too pedestrian, and others leaned on editors to help them decide. Most of them did try it out on somebody to see if, in fact, it is as interesting as they thought. So at many stages in the process, these writers are involved with their audience from topic selection down to choosing the appropriate word.

In summary, then, I'm not sure I found as many differences as I did similarities which may be encouraging to us as writing teachers. We may actually have a teachable subject! All six of the writers focused on essays as making connections, as an opportuinty for learing something. Most have a community of readers who function throughout the process. Some may have funny quirks like Gould's platonic outline or Swain's need to recopy the essay from the

beginning, but fundamentally they think; they research; they discuss; they write, and they revise.

And one last thing I learned which might be encouraging both to us and our students. They think it fun. Even Swain who hates to write does it to "entertain" himself. Bernstein said no professional writer finds it fun, but then admitted the emotional involvement was fun. Thomas said it was in the making of connections that "all the fun comes in." Dyson said he found the idea of influencing an audience "very satisfying." Morowitz said that he had fun trying to relate events. And, finally, Gould who said, "essays are so much fun."